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Boosting IT Governance Maturity in Automotive Manufacturing: A COBIT 2019-Based Analysis

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Abstract. This study delves into the IT governance practices of an automotive manufacturing company in Bogor, West Java, established in 2008. Specializing in automotive components and electronic parts, the company operates in an industry significantly influenced by global technological advancements. Acknowledging the pivotal role of IT in optimizing operations, the company adopts the COBIT 2019 framework to enhance governance. Through COBIT 2019 analysis, critical issues like system integration challenges, outdated technology, lack of operational procedures, guidelines, and server instability are identified. Assessing current IT capability levels in assets, service requests, and problem management reveals a standing at level 2, contrasting with the targeted level 4. Specific objectives, including BAI09 (Managed Assets), DSS02 (Managed Service Request and Incidents), and DSS03 (Managed Problems), measure at level 2, showcasing a notable 2-level gap from the targeted level 4. To bridge this gap, recommendations focus on proactive measures such as audits, streamlined documentation, vigilant monitoring, and strategic maintenance planning. Emphasizing systematic recording and documentation of requests and resolutions for recurring incidents, these recommendations aim to achieve the targeted level of IT governance capability and enhance operational efficiency. This investigation provides a roadmap for IT leaders in the automotive manufacturing sector, offering insights into the broader landscape of IT governance amid technological advancements.

Keywords: Capability Level, COBIT 2019, Information Technology Governance

1. Introduction

Technology is an advancement resulting from the engineering interplay between hardware and software, grounded in scientific knowledge, driven by the evolution of time, and shaped by the current needs of humanity (Taufik et al., 2022). Information Technology is an evolution in the field of information that is related to the management, acquisition, storage, and processing of data into high-quality and relevant information. It aids and supports the business needs of a company in decision-making and formulating business strategies (Simarmata et al., 2020). In the era of globalization, information technology is rapidly advancing and has significantly influenced the industrial sector in Indonesia. Currently, information technology has been implemented in the majority of companies operating in various fields such as automotive, consumer goods, finance, real estate, health, and other (Eskak, 2020). The utilization of information technology has become an integral and inseparable aspect of life. This is because nearly all human activities now depend on technology(Ansori, 2019). The current widespread implementation of Information Technology (IT) by various companies is aimed at assisting operational activities and improving overall company performance. This helps enhance business value and enables the achievement of a company's vision, mission, and goals (Oktaviana & Pribadi, 2019).

The automotive manufacturing company under investigation faces several challenges and gaps in Information Technology (IT) management within its operations. One crucial issue is the lack of IT system integration within the company, leading to material inventory inaccuracies and compromising data integrity. Additionally, the use of outdated information technology poses a serious problem, hindering operational efficiency and resulting in losses. Another challenge is the absence of Standard Operating Procedures (SOPs), impacting employees' minimal knowledge of the production recording system and potential IT risks. Frequent server downtime is also a significant issue, causing operational disruptions and delays in order deliveries. A gap exists between the current operational conditions and the desired state. Poor system integration, outdated information technology, the absence of SOPs, and frequent server downtime all pose significant barriers. Through the application of the COBIT 2019 framework, this research aims to provide concrete solutions and recommendations that can be implemented by the company to address these issues. By identifying these problems and gaps, this study is expected to serve as a systematic guide to improving the company's IT management capabilities. Furthermore, the generated recommendations are anticipated to provide a strong foundation for the enhancement and performance improvement of the company's IT, ultimately achieving the desired level of capability according to COBIT 2019 standards. The problems and gaps in IT management at this automotive manufacturing company have significant impacts on various operational aspects and the overall performance of the company. The lack of IT system integration can lead to material inventory inaccuracies, potentially harming productivity, slowing down production processes, and resulting in an inability to meet customer demands optimally.

The use of outdated information technology also seriously impacts operational efficiency. Outdated systems can complicate data access and processing, hinder response speed to market changes, and increase the risk of operational errors. The absence of Standard Operating Procedures (SOPs) can create uncertainty in production management and IT risks. Employees without clear operational guidelines may struggle to perform their tasks effectively, leading to potential errors and a lack of consistency in operational processes. Frequent server downtime presents a significant obstacle, causing direct disruptions to daily operations. Delays in order deliveries can harm the company's reputation in the eyes of customers, reduce customer satisfaction, and even result in financial losses. Overall, the issues and gaps in IT management can hinder the company's growth and innovation, necessitating appropriate measures to enhance performance and competitiveness in the automotive industry market.

To assist the company in maximizing the performance of business processes through IT processes effectively and cohesively, the company needs to implement IT governance (Rizki & Bahtiar, 2017). This governance framework ensures that the IT implemented by the company consistently supports, manages, and aligns with the business objectives of the company(Andry & Setiawan, 2019). IT

Governance is an activity that involves procedures and guidelines such as control, planning, assessment, and supervision of accountability structures and decision-making as a corporate strategy in managing resources to achieve the business goals of the company(Fikri et al., 2020; Gregory et al., 2018). The success of IT governance can be observed when there is alignment between the implementation of IT and the company's objectives (Bayastura et al., 2021). To assist the company in managing good IT governance, the company should use a framework created by ISACA, namely COBIT 2019 (Gerl et al., 2021).Utilizing the COBIT 2019 framework allows organizations to assess their capability levels and provides references and guidelines for enhancing their internal IT governance (Patón-Romero et al., 2019). ISACA is an international organization/association specializing in IT governance and IT Governance. Its goal is to assist both individuals and companies in achieving their business objectives in the field of IT (Labib, 2019). Several previous studies have utilized the COBIT 2019 framework to assess the capability level of companies (Ikhsan & Nugraheni, 2022; Rajjani et al., 2019; Widyatama et al., 2020), and measure the maturity of their IT governance (Haster & Hartomo, 2022). On the other hand, in other earlier research, the evaluation of company capability levels was conducted using the COBIT 5 framework (Fernandes et al., 2020; Louis & Fianty, 2023; Reynard & Wella, 2018).

Frameworks that can be used in IT governance include, among others, COBIT, ITIL, CMMI, and TOGAF(Ibrahim & Abdessamad, 2019). COBIT is oriented towards measuring the effectiveness of implementing IT in the business processes of an organization(Haes et al., 2020). ITIL focuses on measuring the quality of IT services provided by a company to its customers (Gërvalla et al., 2018). CMMI focuses on evaluating the quality of systems or IT applications used within a company (White, 2018). Lastly, TOGAF is focused on designing an enterprise architecture within a company with the aim of developing business through the use of IT (Kotusev, 2018). In this study, the COBIT 2019 framework will be used as it is the latest version of the COBIT framework (Harisaiprasad, 2020). Additionally, COBIT 2019 places a strong emphasis on aligning business goals and implementing IT benefits within the company (Insani, 2022). Therefore, this research will evaluate the IT governance related to the issues faced by the company that engaged in automotive and electronic manufacturing. The company is facing challenges such as non-integrated IT systems, outdated management information technology, frequent server downtimes, and there are no SOP that governing the use of IT systems. Consequently, the company needs to assess its IT governance using the Information System Maturity Level assessment method based on the COBIT 2019 framework. The objective of this research is to provide solutions or recommendations for the issues faced by the company after implementing the COBIT 2019 framework in the company. COBIT 2019 has standards that can be used as guidelines in conducting IT activities to align IT functions with business objectives in a company (Anoruo & CGEIT, 2019).

2. Related Works

Based on the conducted research, the COBIT 2019 framework is utilized for designing and measuring IT governance in several companies, each facing different issues. Currently, the company challenges include recurrent issues with hardware and network, prolonged time for IT damage repairs, and data duplication. The research recommends establishing Standard Operating Procedures (SOP) and policies related to technology identification, tracking systems, reporting, and documentation, especially during sudden or emergency innovations in applications. However, the connection between various sources feels disjointed. Integrating more transitional phrases would enhance the overall flow (Ikhsan & Nugraheni, 2022). Moreover, at PT. Semen Indonesia (Persero) Tbk., suboptimal risk management due to outdated technology is identified, requiring updates in line with current IT developments. The study offers nine recommendations to assist the company in addressing its existing challenges (Rajjani et al., 2019). Furthermore, at PT Nindya Karya (Persero), although ISO standards are implemented in governance and operational policy processes, the effectiveness of Third-Party Service Management and Data Monitoring remains suboptimal. The suggestion is to enhance monitoring and evaluation of IT

performance for more efficient operations in the future (Widyatama et al., 2020). Subsequent research discusses the maturity level analysis of a government program, namely the smart city, in North Lombok Regency, Indonesia, implementing the COBIT 2019 framework. The findings suggest that the smart city program in North Lombok Regency is considered poorly managed and does not meet requirements, emphasizing the need for SOPs related to the smart city program and a specific budget for IT infrastructure asset spending to support the smart city program effectively. The local government is urged to promptly fulfill these requirements (Haster & Hartomo, 2022).

In addition to adopting the COBIT 2019 framework, some studies also utilize the COBIT 5 framework as an instrument to assess the capability level in their research. At PT. Supra Boga Lestari, security, IT control, and IT governance are not yet optimal. Employees lack knowledge and adherence to provided SOPs, and the company's IT system is not integrated in real-time. Recommendations include creating SOPs related to human resource management encompassing all elements, providing more education and training to employees, and documenting based on the company's objectives (Reynard & Wella, 2018). Furthermore, a technological insurance agency faces issues with HRIS lacking SOPs for problem handling and risk in data operation, along with server problems leading to data leaks in HRIS. Recommendations include conducting audits on the company's IT resources and enhancing the utilization of IT (Louis & Fianty, 2023) A textile industry company in Yogyakarta encounters problems with inaccuracies in employee data, making it challenging to determine salaries. Recommendations for the company involve verification, approval, and fulfillment of incident service requests, classification creation for each type of problem, and periodic monitoring (Fernandes et al., 2020).

Based on the results of the previous seven studies, it can be concluded that several studies use the COBIT 2019 framework, while some earlier studies also adopt the COBIT 5 framework. Additionally, there are studies discussing maturity level analysis using the COBIT 2019 framework. The research objects in the previous studies cover various fields, such as impact analysis consulting services and environmental laboratories, state-owned enterprises, retail industry, government institutions (Kemkominfo RI), and technology insurance. Based on the previous research, several aspects are adopted in the design of this research, involving the application of the COBIT 2019 framework to evaluate the capability level, gap analysis, and recommendations for improvement and level enhancement. Additionally, another aspect adopted in this research based on previous studies is the maturity level analysis of a program using the COBIT 2019 framework. Therefore, this research is planned to use the COBIT 2019 framework with a focus on incident, service, and problem management, as well as asset management. The research object is automotive and electronic manufacturing sector that facing challenges such as poorly integrated IT systems, lack of SOPs regarding IT system usage, outdated information management technology, and frequent server downtime. This study aims to evaluate the capability level of the company's IT governance system, providing specific recommendations for improvement and enhancing the capability level. These recommendations are expected to assist the company in overcoming its current challenges.

3. Method

In this study, other methods that will be utilized include a qualitative approach, the interview procedures, question design, and participant roles play integral roles in shaping the methodological framework of this study. Interview procedures encompass the systematic steps followed during the interview process, including scheduling, preparation of interviewees, and the actual execution of interviews using platforms such as Google Meet and Zoom Meeting software. These procedures are crucial for maintaining consistency and reliability in data collection. Question design, on the other hand, focuses on crafting thoughtful and targeted interview questions that align with the research objectives. In this study, questions are meticulously formulated based on the COBIT 2019 guidelines, ensuring they effectively measure the capability level of IT governance at the company. Participant roles define the responsibilities of individuals involved in the interview process, establishing clear expectations for both

interviewees and researchers. Participants, comprising heads of the IT division, the PPIC division, and the CEO, play key roles in providing insights related to IT governance and company challenges. Researchers, on the other hand, bear the responsibility of designing relevant questions, conducting interviews, and subsequently analyzing the gathered data. The collaborative efforts of participants and researchers are fundamental to ensuring the success of the interview phase, contributing valuable information that will shape the foundation of the study's findings. The research flow is the sequential process from the beginning to the end of the entire research (Peifer et al., 2022). The following is the flow of the conducted research:

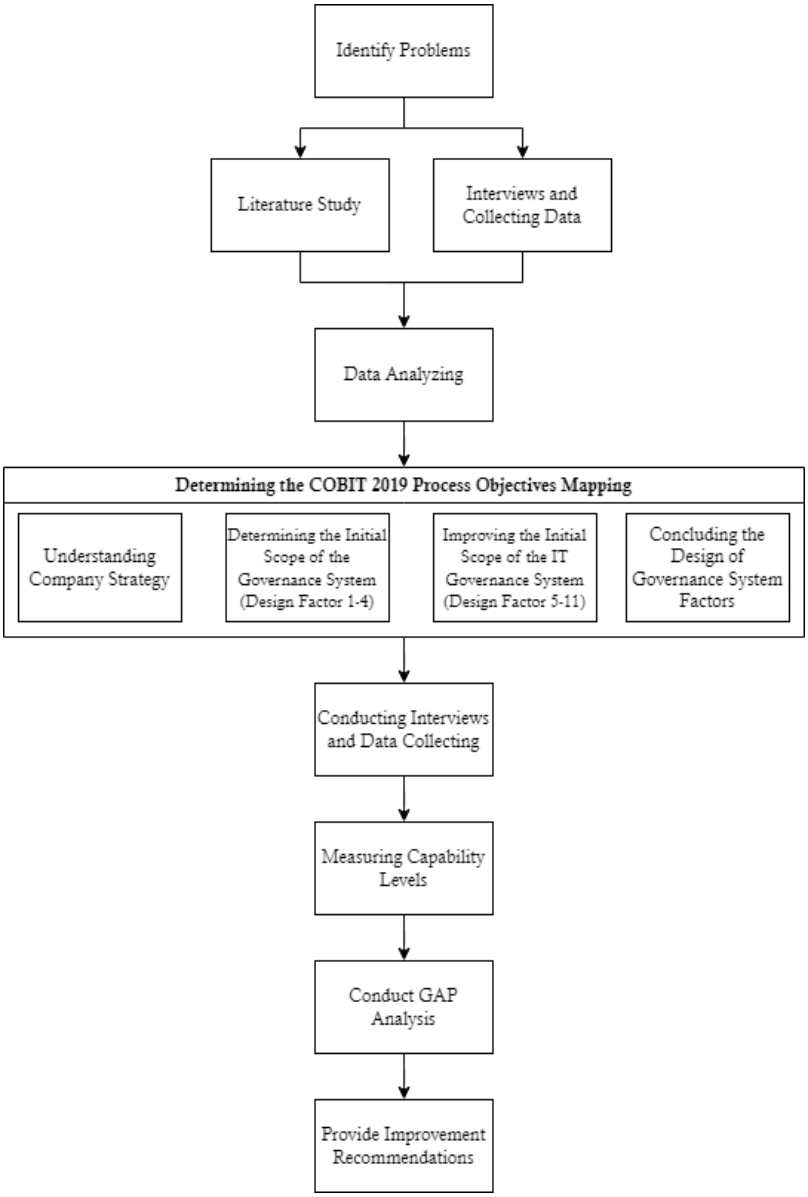

Fig. 1: Research Flow.

In Fig 1, the research flow for this study is this study is delineated. Initially, the identification of issues within the company is undertaken to gain insights into the prevailing challenges (Cuatanto & Sutomo, 2023; Jaya & Fianty, 2023). This forms the research topic, and data is gathered through interviews with company representatives. The subsequent phase entails data collection via literature review and interviews. The literature review encompasses a study of pertinent books and journals to comprehend the intricacies of the COBIT 2019 framework, while interviews with company

representatives are conducted using Zoom Meeting and Google Meet software, as well as in-person interviews, to grasp the existing issues within the company. Following this, data analysis is conducted, scrutinizing the information acquired from interviews for its relevance to the research topic. The subsequent stage involves the mapping of current company issues—such as frequent server downtime, lack of SOP, and outdated and poorly integrated IT systems—utilizing the COBIT 2019 framework. Based on the COBIT 2019 framework, five domains are selected, and the COBIT 2019 Design Toolkit is employed for objective mapping (Amore et al., 2023).

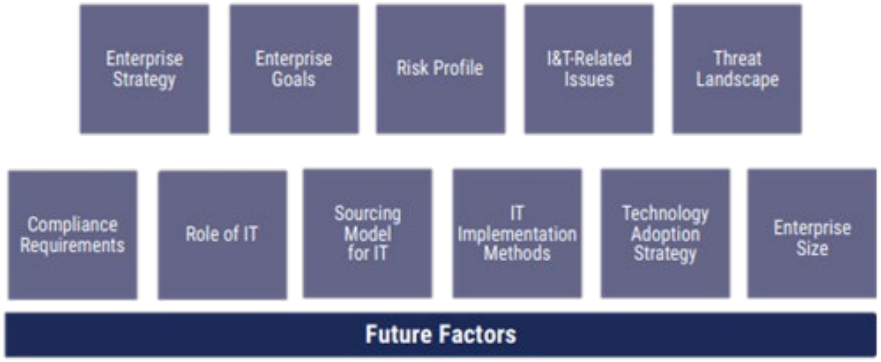

Fig. 2: COBIT 2019 Design Factor

(Audit & Association, 2018)

In Fig. 2, the COBIT 2019 Design Factors are presented (Audit & Association, 2018). These 11 factors significantly influence a company's IT governance system, aiding in the sustainable use of IT systems (Darmawan & Wijaya, 2022). After mapping, interviews with company representatives are conducted based on RACI charts and audit documents (Miranda & Watts, 2022). A RACI chart (Responsible Assignment Matrix) is an abbreviation for Responsible, Accountable, Consulted, and Informed, which serves as a tool commonly used to provide an overview of the responsibilities and roles of each employee working within a company (Kantor, 2018). Moreover, companies utilize RACI as a tool for decision-making processes. The allocation of roles among employees within the company is based on the abilities possessed by each individual (Suhanda & Pratami, 2021). Calculation is performed based on assessments from company representatives' completed audit documents to determine the maturity level of the company. The next step involves conducting a gap analysis by comparing the current capability level results with the target capability level. GAP analysis is a tool or process used to identify whether there is a gap or difference in the current capability situation (as-is) of the company compared to the intended future capability situation (to-be) (Kim & Ji, 2018). By employing GAP analysis, it aids the company in adjusting the current situation to achieve the desired or expected level of management and capability in the company's situation (Alshare & Sewailem, 2018). The final step is to offer recommendations for improvement and level enhancement to the company based on the capability level results. These recommendations aim to assist the company in resolving its current challenges.

4. Result and Discussion

The first process undertaken before measuring the capability level is to identify the current issues faced by the company. The issue identification process involves conducting interviews with company representatives via Zoom Meeting, including the Head of IT Division, Head of PPIC Division, and CEO of the company. The objective is to gain insights into the information technology used by the company and identify problems from both IT and business perspectives.

Based on the conducted interviews, it was found that the company is currently facing several issues,

namely, the production stock recording system is not well-integrated, leading to data duplication or inaccuracies; the lack of Standard Operating Procedures (SOP) for proper use of the IT system, resulting in employees being unable to use the IT system effectively and having minimal knowledge of its usage; outdated information management technology in the company, indicating that the hardware specifications used are considered outdated or obsolete; frequent server downtimes; and the production stock recording system lacks updates or feature enhancements, such as customization, auto-save functionality, etc., hindering employees' workflow.

4.1. COBIT 2019 Objective Process Mapping

At this stage, it is necessary to undergo an analysis process related to the level of IT governance capability at the company using the COBIT 2019 framework. The instrument used for mapping COBIT process objectives can utilize the COBIT 2019 Design Toolkit, which functions to assist in measurement and establish process objectives that align with the current conditions of the company

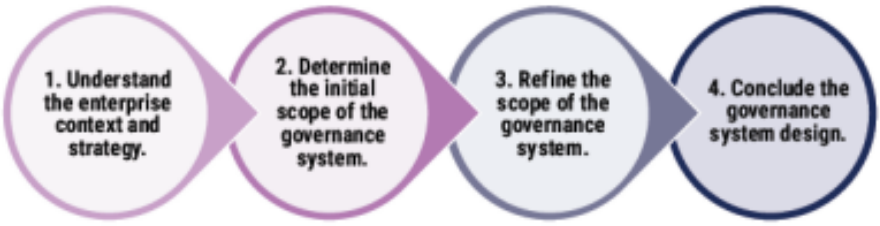

Fig. 3: COBIT 2019 Design Factor

Figure 3 illustrates the workflow of COBIT 2019 governance design, consisting of 4 steps. These procedures lead to the prioritization of organizational governance objectives, aiming to establish a governance system tailored to the enterprise's requirements.

1. Understand The Enterprise Context and Strategy
   Understanding and examining the company's strategy, goals, risk profile, and IT-related issues, it was found that the company currently focuses on manufacturing components for the automotive and electronic industries and providing the best services to their customers.
2. Determine The Initial Scope of The Governance System.
   The company determines the initial scope of the governance system by evaluating design factors 1-4, assessing the organization's strategy, objectives, risk profile, and IT-related concerns
3. Refine The Scope of The Governance System.
   The company proceeds with determining the scope of the governance system by measuring the capability level on design factors 5-11 to assess the IT threat landscape, compliance, IT role, IT resource, IT implementation methods, technology adoption strategy, and company sized.
4. Conclude The Governance System Design.
   After the company mapped the governance system design using the COBIT 2019 Design Toolkit, the resulting graph covering governance priorities and management goals is as follows:

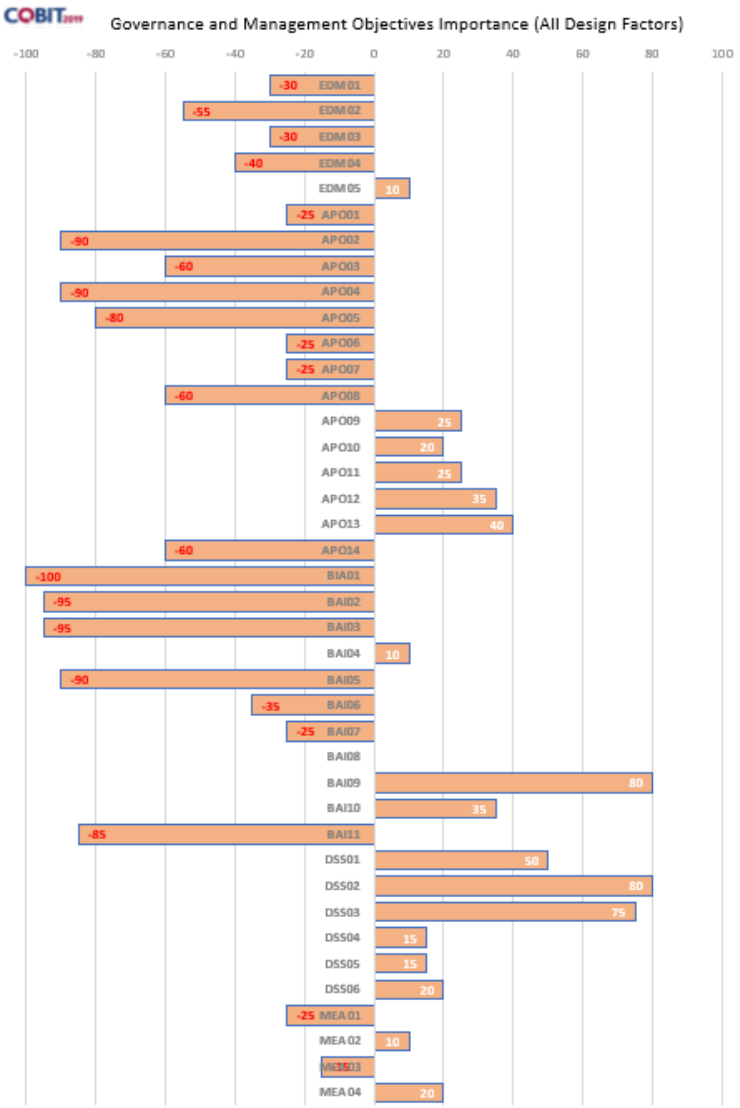

Fig. 4: COBIT 2019 Design Factor

In Figure 3, the COBIT 2019 Design Toolkit was employed to map design factors, yielding importance values for process objectives aligned with the company's current need. The assessment scale ranges from -100 to 100, where 100 signifies the highest importance. Not all assessed process objectives are deemed equally important; those scoring 75 or higher are prioritized with a target capability level of 4, while those scoring 50 or higher are assigned a level of 3. Objectives scoring 25 or higher aim for a target capability level of 2. High-priority process objectives, with values of 75 or higher, include BAI09 – Managed Assets, DSS02 – Managed Service Request and Incidents, and DSS03 – Managed Problems.

4.2. Measuring Capability

The capability level serves as a tool during performance evaluations related to handling IT risk management. In general, capability is utilized as an informative indicator regarding the current and desired conditions experienced by the company. After conducting interviews and discussions with head of PPIC and the head of IT using the guidelines from the COBIT 2019 framework, the obtained average calculation results for each objective and its level of capability are as follows:

1) BAI09 – Managed Assets

Based on the results of the calculations carried out according to the objectives in the BAI09 – Managed Assets process, they are as follows:

Table 1: BAI09 Calculation Result

Objective Process	Average Score	
BAI09.01	86.6%	
BAI09.02	77%	
BAI09.03	82%	
BAI09.05	82%	
Total Average Capability Level	**Total**	327.6%
	Average / 4	81.9%

Table 1 provides a comprehensive breakdown of the outcomes derived from the calculations aligned with the specified objectives in the BAI09 – Managed Assets process. Each row in the table corresponds to a distinct objective within the BAI09 process, and the subsequent columns showcase the average scores attained for these objectives. For instance, BAI09.01 achieved an average score of 86.6%, BAI09.02 attained 77%, BAI09.03 recorded 82%, and BAI09.05 reached 82%. The "Total Average Capability Level" row aggregates these individual scores, resulting in a total of 327.6%. Dividing this total by the number of objectives (4) yields the "Average / 4" value, indicating an average capability level of 81.9%. Notably, this average signifies the overall performance of the company in meeting the specified objectives within the BAI09 process. The conclusive statement discusses the practical implications of the calculated average capability level. With a cumulative score of 81.9%, the company falls within the level 2 capability category. However, it is emphasized that progression to measure level 3 capability is not feasible, as the calculated result falls short of the required 85% threshold. This comprehensive assessment in Table 1 offers valuable insights into the company's standing concerning the Managed Assets process objectives and provides a basis for targeted improvement strategies.

2) DSS02 – Managed Service Request and Incidents

The next step is to calculate the DSS02 – Managed Service Request and Incidents process objective. Here are the average results from the calculation of the DSS02 objective:

Table 2: DSS02 Calculation Result

Objective Process	Average Score	
DSS02.02	86.6%	
DSS02.03	77%	
DSS02.04	82%	
DSS02.05	82%	
DSS02.06	95%	
DSS02.07	80%	
Total Average Capability Level	**Total**	493.65%
	Average / 6	82.29%

Table 2 presents the results of this assessment, offering a detailed breakdown of the average scores achieved for each individual objective within the DSS02 process. The objectives outlined in Table 2—DSS02.02, DSS02.03, DSS02.04, DSS02.05, DSS02.06, and DSS02.07—have been assigned average scores of 86.6%, 77%, 82%, 82%, 95%, and 80%, respectively. These scores provide a nuanced understanding of the company's effectiveness in managing service requests and incidents within the DSS02 framework. The "Total Average Capability Level" row consolidates these individual scores, resulting in a total of 493.65%. Dividing this total by the number of objectives (6) yields the "Average / 6" value, indicating an overall average capability level of 82.29% for the DSS02 process. The

implications of this assessment are highlighted in the paragraph, explaining that with an average score of 82.29%, the company falls within the level 2 capability category. However, similar to the previous process, the company cannot progress to measure level 3 capability as the calculated result falls short of the required 85% threshold. This comprehensive evaluation of the DSS02 process in Table 2 provides valuable insights into the company's ability to manage service requests and incidents, guiding potential strategies for improvement and optimization.

3) DSS03 – Managed Problems

The next step is to calculate the DSS03 – Managed Problems process objective. Here are the average results based on the calculations for the DSS03 – Managed Problems process objective:

Table 3: DSS03 Calculation Result

Objective Process	Average Score	
DSS03.01	83.33%	
DSS03.03	80%	
DSS03.04	80%	
Total Average Capability Level	**Total**	243.33%
	Average / 3	81.4%

Table 3 presents the results of this evaluation, offering a breakdown of the average scores achieved for each individual objective within the DSS03 process. Specifically, the objectives outlined in Table 3—DSS03.01, DSS03.03, and DSS03.04—have obtained average scores of 83.33%, 80%, and 80%, respectively. These scores provide insights into the company's effectiveness in managing problems within the DSS03 framework. The "Total Average Capability Level" row consolidates these individual scores, resulting in a total of 243.33%. Dividing this total by the number of objectives (3) yields the "Average / 3" value, indicating an overall average capability level of 81.4% for the DSS03 process. The paragraph underscores the implications of this assessment, elucidating that with an average score of 81.4%, the company falls within the level 2 capability category. However, similar to the previous processes, the company cannot advance to measure level 3 capability since the calculated result falls short of the required 85% threshold. This comprehensive evaluation of the DSS03 process in Table 3 provides valuable insights into the company's ability to manage problems, offering guidance for potential strategies aimed at enhancement and optimization.

4.3. Gap Analysis

After the calculation of all objects has been completed, the next step is to compare the expected target using design factors with the measurement results. If the importance value reaches 75 or more, then the required capability level is 4. Gap analysis is necessary to understand the comparison between the target level and the calculation results, as well as to identify areas that need to be improved or enhanced. Determining an expected capability level for each process activity is done using guidelines from the COBIT 2019 design toolkit. The following are the results of gap analysis based on the current measurement of the IT governance capability level at the company.

Table 4: Gap Analysis

Objective Process	Current Capability	Expected Capability	Gap
BAI09 – Managed Assets	0.59	0.13	0.69
DSS02 – Managed Service Request and Incidents	0.24	0.01	0.67
DSS03 – Managed Problems	0.46	0.39	0.44

Table 4 delineates the disparity between the current achievement of capability levels and the targeted capability levels, aiding the company in evaluating and understanding the conditions experienced during the implementation of IT governance. Currently, within the BAI09, DSS02, and

DSS03 domains, the capability level is at level 2, while the expected capability level is at level 4. Consequently, there exists a notable gap of 2 levels between the current capability level and the anticipated capability level. This comprehensive analysis provides valuable insights for the company to strategically address and bridge the identified gaps in IT governance capability.

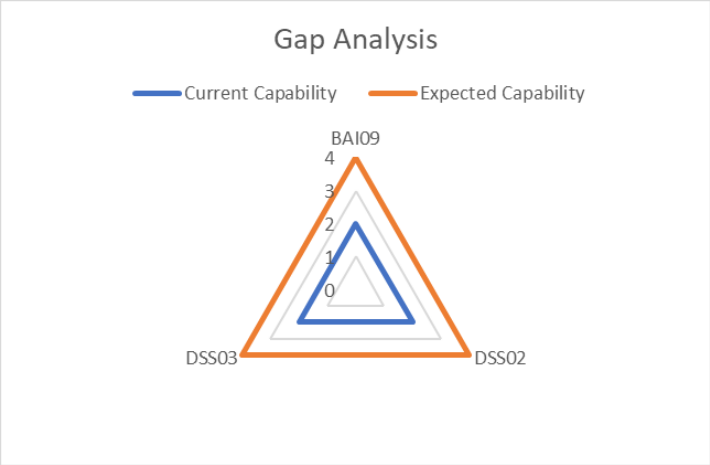

Fig. 5: Radar Chart Gap Analysis Results

Figure 5, a radar chart, serves as an illustrative representation of the results obtained from the gap analysis. The radar chart is a powerful visual tool used to comprehensively elucidate the gap analysis findings, providing a clear depiction of the current capability level in contrast to the targeted capability level. Each axis on the radar chart corresponds to a specific capability domain, allowing for a visual assessment of the gaps in IT governance capability across various dimensions. By leveraging this radar chart in Figure 5, stakeholders and decision-makers can gain a nuanced understanding of the disparities existing between the achieved capability levels and the aspired target levels. The chart enables a holistic view of the company's IT governance landscape, facilitating strategic discussions on areas that require attention, improvement, or enhancement. This visual representation enhances the interpretability of the gap analysis results, empowering the organization to make informed decisions and prioritize initiatives aimed at bridging the identified gaps in IT governance capability.

4.4. Finding and Impacts

The results of the previously conducted objective measurements reveal several findings from activities that scored $\leqslant$ 50 (Partially Achieved). These findings aim to assess the performance of the applied IT governance and can serve as a guide for improvement. The information derived from these findings is crucial for understanding the impacts within the company.

Table 5: Finding and Impacts of Domain Process

Objective Process	Findings	Impacts
DSS02.05	In the company, not all solutions used to address an incident can resolve the majority of incidents or events within the company.	The company's incident management efficiency is declining, causing delays in issue resolution and increasing the risk of significant losses.
DSS03.01	The company lacks documented procedures and clear, labeled records for reference in issue resolution.	The company takes a long time to resolve recurring issues and to track the status of problems it faces because it lacks clear procedures and documentation

Table 5 presents a comprehensive overview of the identified findings and their subsequent impacts on the IT governance processes. For instance, within DSS02.05, the company faces challenges in efficiently managing incidents, leading to delays in issue resolution and heightened risks of significant losses. Similarly, in DSS03.01, the absence of documented procedures and clear records hampers the company's ability to resolve recurring issues promptly and track their status effectively. These prioritized findings lay the foundation for recommendations, drawing on COBIT 2019 activities, to address and mitigate these issues effectively. The insights garnered from Table 5 provide a roadmap for targeted improvements in the IT governance framework, ensuring enhanced efficiency and risk management within the company.

4.5. Improvement Recommendations

The next step is to provide recommendations to the company aimed at addressing the identified findings promptly. Improvement recommendations for the DSS02, and DSS03 objective processes will be outlined based on the previously described findings and impacts. The purpose of providing improvement recommendations to the company is to assist the company in improving activity processes that obtain a value of ⩽ 50 (Partially Achieved) based on the findings and impacts in tables 4.10 and 4.11. The following are improvement recommendations for the DSS02 – Managed Services Request and Incidents sub-process.

Table 6: Finding and Impacts of Domain Process

Sub-Process	Activity
DSS02.05	The IT division will begin conducting a comprehensive audit related to the solutions commonly used to resolve incidents. Subsequently, an evaluation will be carried out to assess whether these solutions can meet the needs and address the majority of potential incidents.

In Table 6, there is a recommended improvement in the DSS02 domain with the sub-process DSS02.05, which can be suggested to the company to assist in addressing the current issues. The following is the recommended improvement for the DSS03 domain.

Table 7: Finding and Impacts of Domain Process

Sub-Process	Activity
DSS03.01	The IT division will implement a formal procedure regarding labeling each issue and historical documentation. Additionally, the IT division must ensure that this procedure includes clear and actionable steps that can be followed by other employees.

In Table 7, there is a recommended improvement in the DSS03 domain with the sub-process DSS03.01, which can be considered as a recommendation for the company to assist in resolving the issues currently experienced by the company.

4.6. Recommendations for Enhancement

Recommendations for enhancement are audit suggestions aimed at improving the efficiency of Information Technology management and business process controls. The goal is to assist organizations in enhancing their capability levels, as currently experienced by the company, which is striving to elevate its level from 2 to 4. The following are detailed research recommendations for the BAI09 domain - Managed Assets obtained from the findings of the audit document questionnaire.

Table 8: Recommendations for Enhancing BAI09 Process to Level 3

Objective Process	Findings
BAI09.01	• Verify the proper accounting of all assets.
BAI09.02	• Integrate scheduled downtime into the comprehensive production timetable. Arrange maintenance tasks strategically to mitigate negative effects on business operations. • Sustain the robustness of essential assets through regular preventive maintenance. Supervise performance and, when required, offer substitute and/or supplementary assets to reduce the risk of failure. • Develop a preventive maintenance blueprint for all hardware, taking into account cost/benefit analysis, vendor suggestions, the potential for power disruptions, qualified personnel, and other pertinent considerations.
BAI09.03	• Implement assets following the standard lifecycle, including change management and acceptance testing. • If possible, reallocate assets when they are no longer needed due to changes in user roles, redundancy in services, or service discontinuation. • Plan, authorize, and execute retirement-related activities, maintaining appropriate records to meet ongoing business needs and regulations.
BAI09.04	• Follow a standard implementation lifecycle, incorporating acceptance testing and change management, throughout the asset implementation process. • Allocate users to assets, assigning them critical responsibilities for acceptance and approval tasks. • In cases where resources become obsolete due to redundancy in service providers, alterations in user roles, or other contributing factors, endeavor to redistribute them, taking into account elements like service provider redundancy, shifts in user roles, or other pertinent considerations.
BAI09.05	• Conduct regular audits to identify all installed software, ensuring that their licenses are valid and comply with the applicable regulations. Regularly perform audits to detect and verify the presence of all software installations, ensuring that their licenses are valid and adhere to relevant regulations.

The content of Table 4.8 presents improvement recommendations for the 5 sub-process activities in the BAI09 objective process. The company needs to pay attention to the recommendations for the 5 sub-process activities in BAI09 to enhance the level of IT governance capability of the company to level 3. The table below contains recommendations for improving level 4 in the BAI09 domain process based on the results of the audit document questionnaire.

Table 9: Recommendations for Enhancing BAI09 Process to Level 4

Objective Process	Findings
BAI09.01	• Ensure the existence of all owned assets by conducting regular inventory checks, both through physical inspections and by logically aligning data. Adjust the information from the checks and utilize discovery software to support this step. • Routinely evaluate whether each asset continues to provide added value. If so, estimates should be made to determine how long the asset is expected to be beneficial.
BAI09.02	• Monitor the performance of critical assets by observing incident trends. If necessary, take corrective action or replacements.
BAI09.03	• Dispose of assets responsibly when they no longer provide useful benefits due to the retirement of all related services, outdated technology, or lack of users, taking into account the environmental impact.
BAI09.04	• Evaluate maintenance costs, consider the reasonableness of the expenses, and explore options with lower costs. If necessary, consider replacement with new and cost-effective solutions.
BAI09.05	• Conduct regular audits to identify all installed licensed software.

	• If the number of instances is lower than the number owned, decide whether to maintain or terminate licenses, taking into account potential cost savings such as unnecessary maintenance, training, and other expenses. • If the number of instances exceeds the number owned, consider opportunities to first eliminate instances that are no longer needed or justified. Subsequently, if necessary, acquire additional licenses to comply with licensing agreements.

Table 9 presents improvement recommendations for the 5 sub-process activities in the BAI09 objective process. The company needs to consider these recommendations for the 5 sub-process activities in BAI09 to enhance the level of IT governance capability to level 4. Subsequently, there is a table containing recommendations for level improvement in the DSS02 domain – Managed Services Request and Incident, derived from the assessment using the conducted audit documents. Below is the table of process improvement recommendations for DSS02 to reach level 3.

Table 10: Recommendations for Enhancing DSS02 Process to Level 3

Objective Process	Findings
DSS02.01	• Define policies and escalation procedures to be followed in handling incidents, especially large-scale and security incidents. • Establish knowledge resources related to incidents and requests, outlining how to access and leverage them. • Formulate an incident model for known types of errors, aiming to enable efficient and effective resolution.
DSS02.02	• Fulfill request requirements by following established procedural steps. When possible, utilize self-accessible automated support systems and employ predefined request models for frequently requested items or services.
DSS02.07	• Identify stakeholders in information and understand their data or reporting needs. Subsequently, determine the frequency of required reports and the reporting mediums to be employed.

Table 10 provides improvement recommendations for the 3 sub-process activities in the DSS02 objective process. The company needs to consider these recommendations for the 3 sub-process activities in DSS02 to enhance the level of IT governance capability to level 3. Below is the table containing recommendations for level improvement in the DSS02 domain, based on the questionnaire results from the audit documents.

Table 11: Recommendations for Enhancing DSS02 Process to Level 4

Objective Process	Findings
DSS02.07	• Generate reports swiftly and distribute them, or provide online access to organized data. • Classify and analyze incidents and service requests. Identify patterns and trends related to inefficiencies, SLA violations, or recurring issues.

In Table 11, recommendations for improvement are presented for 1 sub-process activity in the objective process DSS02. The company needs to consider recommendations for this 1 sub-process activity in DSS02 to enhance the level of IT governance capability to level 4. Next is a table containing recommendations for raising the level in the DSS03 domain – Managed Problems, derived from an assessment using the conducted audit documents. Here is the table of recommendations for improving the DSS03 process to level 3.

Table 12: Recommendations for Enhancing DSS03 Process to Level 3

Objective Process	Findings
DSS03.02	• By comparing event data with a database of known and suspected errors (as reported by external vendors), one can detect known issues that may be faults. Assign a known error status to these issues. • Link configuration elements impacting the known or occurring issues. • Generate reports to communicate the status of ongoing issues and to coordinate the ongoing impact of unresolved issues. Throughout the problem resolution process, monitor its progress, taking into account input from IT configurations and change management.
DSS03.03	• Identify, assess, prioritize, and implement remedies (through IT change management) for known issues based on business impact, urgency, and cost/benefit analysis.
DSS03.04	• Regularly obtain IT change management updates regarding the status of issue and error resolution during the problem-solving process.
DSS03.05	• Gather information on issues related to incidents and changes in I&T and share it with key stakeholders. To discuss existing problems and potential solutions, owners of the incident, problem, change, and configuration management processes should communicate with each other through reports and regular meetings. • Ensure regular meetings between managers of incident, problem, change, and configuration management, as well as process owners, to review known issues and upcoming improvement plans. • Identify the root cause of the problem and implement long-term fixes or sustainable solutions. Submit modification requests through the management procedure.

In table 12, recommendations for improvement are presented for 4 sub-process activities in the DSS03 objective process. The company needs to pay attention to the recommendations for these 4 sub-process activities in DSS03 to enhance the level of IT governance capability in the company to level 3. The following table contains recommendations for raising the level to 4 in the DSS03 domain based on the results of the document audit questionnaire.

Table 13: Recommendations for Enhancing DSS03 Process to Level 4

Objective Process	Findings
DSS03.04	• Continuously monitor the impact of known issues and errors on services • Review and ensure that solutions to major problems have been successful.
DSS03.05	• For the company to monitor all costs associated with issues, record change efforts arising from problem management activities (such as fixing known issues and errors) and provide related reports. • Create reports to oversee the resolution of issues according to business needs and SLAs. Ensure that issues are escalated properly, such as escalating to higher management levels based on approved criteria, involving external vendors, or referring to the change advisory board to elevate the priority of urgent change requests (RFCs) for implementing temporary solutions.

In table 13, there are recommendations for improvement for 2 sub-process activities related to the DSS03 objective process. The company is advised to pay attention to and implement the recommendations outlined for these two sub-process activities in DSS03. This step is expected to contribute to the improvement of the IT management capability level in the company, thereby achieving level 4 according to the IT governance framework.

5. Conclusion

The automotive manufacturing company, in its pursuit of leveraging Information Technology (IT) to streamline daily operational activities, faces several challenges, including inadequate system integration, outdated information technology management, frequent server downtime, and the absence of Standard Operating Procedures (SOP) governing IT system usage. To overcome these hurdles and elevate overall business performance, the company adopts IT governance through the COBIT 2019 framework—an approach designed to assess capability levels and offer guidelines for enhancing IT governance. This study focuses on evaluating the company's IT governance capabilities using COBIT 2019, particularly in areas such as asset management, service and incident requests, and problem resolution.

The findings reveal that most processes, although reaching level 2, have not yet attained the desired level 3. Gap analysis exposes disparities between the current and expected capability levels, shedding light on areas that require attention and improvement. The recommendations put forth include conducting a comprehensive audit of incident resolution solutions, formalizing procedures for problem resolution, and implementing regular asset evaluations. This narrative provides a comprehensive understanding of the challenges confronting the automotive manufacturing company in managing its information technology landscape. The adoption of COBIT 2019 emerges as a strategic move to enhance IT governance, accompanied by specific improvement recommendations aimed at achieving the desired capability level goals. Moving forward, future research endeavors could delve deeper into specific aspects of IT governance or explore the implementation of emerging technologies to further refine and optimize the company's IT processes.

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